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SYSTEM AND METHOD FOR PROVIDING A SIMULTANEOUS RING SERVICE FOR A LANDLINE TELECOMMUNICATIONS UNIT AND AN ASSOCIATED WIRELESS TELECOMMUNICATIONS UNIT

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BACKGROUND OF INVENTION

Field of Invention

The present invention relates generally to telecommunications services and, more particularly, to systems and methods for providing a simultaneous ring service for a landline telecommunications unit and an associated wireless telecommunications unit.

Description of the Background

Increasingly in today's society there is a need for individuals to "stay in touch," whether it be with business contacts, co-workers, friends or family. A primary avenue for allowing individuals to stay in touch are the telephone networks, both landline or wireless. These telecommunication methods have their drawbacks, however. Significantly, if an individual is not sufficiently proximate to their telephone, the individual cannot answer an incoming call before it stops ringing, in which case the call often goes unanswered. The advent of answering machines and voice messaging systems have ameliorated this problem, but even these technological advancements are not acceptable for all situations. Some circumstances simply require more personal communication capabilities.

One known solution to this problem is the so-called "simultaneous ring" telephone service. According to the typical simultaneous ring service, when a called party receives an incoming call on their landline telephone, a wireless telephone associated with the called party would ring relatively simultaneously, allowing the called party to answer the most accessible phone. For example, a person may have the simultaneous ring service established for his work phone, such that whenever a calling party calls him at work, not only does his work phone ring, but also his wireless telephone may ring. As a result, the businessman need not miss any important work-related calls when he is out of the office.

There are a number of known mechanisms for implementing the simultaneous ring service. One is a switch-based system. In a switch-based system, an incoming call to a pre-designated directory number is additionally routed to a number of other pre-designated directory numbers. For example, an incoming call to the businessman's work phone may also be additionally routed to the businessman's home and/or mobile phones. The switch-based systems, however, treat each call the same. Accordingly, when one of the other pre-designated directory numbers is for a mobile phone, the system cannot account for inherent delays in wireless networks when connecting calls to mobile end users. As a result, a disgruntled calling party is likely to hear an unacceptable number of rings from a landline telephone before the mobile end user is able to answer. Alternatively, an answering system for the landline phone may answer before the mobile end-user can answer, thus precluding realization of the very benefits that the simultaneous ring service was intended to provide.

Another known manner for implementing the simultaneous ring service is using the Advanced Intelligent Network (AIN) of the public switched telephone network (PSTN). The AIN is an intelligent network that provides enhanced voice and data services and dynamic

routing capabilities. Prior implementations of the simultaneous ring service in AIN-based systems, however, have suffered from human-design defects. For example, in some AIN-based implementations, a second of the pre-designated phones continues to ring after a first is answered, which often leaves the calling party confused and annoyed. Additionally, AIN-based systems have suffered from problems when they are required to interface with wireless networks. For example, in prior AIN-based implementations where incoming calls to a landline telephone are also to ring simultaneously with a mobile telephone, if the mobile unit was powered off or was out of range, but had a voice messaging system, the voice messaging system would answer before the landline phone would even ring, or not long thereafter. Similarly, this situation would also preclude realization of the benefits that the service was intended to provide.

Accordingly, there exists a need for a simultaneous ring service that can effectively interface with a wireless network. There also exists a need for such a service that is "invisible" to the calling party. There further exists a need for such a service that may be implemented in a cost-efficient and robust manner, without unnecessarily using the resources of expensive telecommunications equipment.

BRIEF SUMMARY OF THE INVENTION

The present invention is directed to a system and method for providing a simultaneous ring service for a service subscriber. The system utilizes the intelligent functionality of the AIN, and allows the subscriber's designated landline and wireless telecommunications units to ring relatively simultaneously in response to incoming communications to the subscriber's landline unit.

According to one embodiment, the system includes a switch in communication with a landline telecommunications unit associated with the subscriber, a service control point in communication with the switch, and a services nodes in communication with the switch. The switch is for detecting a first terminating trigger specific to the service in response to an incoming communication to the landline telecommunications unit from a calling party. Once the switch detects the incoming call, the service control point may execute a series of verifications, including whether the subscriber's landline telecommunications unit and the subscriber's wireless telecommunications unit are available, i.e., not busy or otherwise inactive.

If neither telecommunications unit is unavailable, the service control point may then instruct the switch to route the incoming call to the services node. In response thereto, the services node may launch two outgoing communications. The intended destination of the first is the subscriber's wireless telecommunications unit and the intended destination of the second is the subscriber's landline telecommunication unit. However, because the services node is not provisioned with the directory number for the subscriber's wireless unit, both calls are routed to the switch. The switch may then detect a wireless indicator in the first outgoing communication from the services node and, in response thereto, query the service control point for the directory number of the subscriber's wireless unit. The service control point may then interrogate its associated database for the number, and then instruct the switch to route the first call to the subscriber's wireless unit. The second outgoing call from the services node may be routed by the switch to the subscriber's landline telecommunications unit.

The services node may then connect whichever telecommunications unit answers first to the calling party. The other call may be dropped by the services node, and the completed call

may be forwarded to the switch in order that the resources of the services node are no longer required for processing the completed communication.

According to another embodiment, due to inherent delays in existing wireless networks, the services node may place the outgoing communication intended for the subscriber's landline telecommunications unit a predetermined time period after placing the outgoing communication intended for the subscriber's wireless telecommunications unit.

If one of the subscriber's landline telecommunications unit and wireless telecommunications unit is unavailable, the service control point may instruct the switch to route the incoming communication to the subscriber's landline telecommunications unit. Accordingly, usurpation of the services node's resources are avoided under such circumstances.

The present invention solves problems experienced in the prior art by only attempting to reach the subscriber's wireless unit if it is available. As a result, in situations where the subscriber's wireless unit has a voice messaging system, the voice messaging system will not answer before the landline unit rings. In addition, the present invention may accommodate inherent delays in wireless networks by, in situations where the wireless unit is available, routing the incoming call to the wireless unit a predetermined time period after routing it to the landline unit. In addition, because the network may maintain the directory number for the subscriber's wireless unit exclusively with the service control point, the present invention obviates the expense and time of provisioning the services node with the same data. Moreover, because completed calls are transferred from the services node to the switch, the present invention does not unnecessarily require the services of the services node for extended call processing purposes. Furthermore, the service of the present invention is essentially invisible to the calling party.

These and other benefits of the present invention will be apparent from the detailed description hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

For the present invention to be clearly understood and readily practiced, the present invention will be described in conjunction with the following figures, wherein:

Figure 1 is a block diagram of an Advanced Intelligent Network (AIN) for integration with a public switched telephone network;

Figure 2 is a block diagram of a system according to one embodiment of the present invention; and

Figures 3 and 4 provide a block diagram of the process flow through the system of Figure 2 according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

It is to be understood that the figures and descriptions of the present invention have been simplified to illustrate elements that are relevant for a clear understanding of the present invention, while eliminating, for purposes of clarity, other elements of a conventional telecommunications network. For example, certain operating system details and modules of certain of the intelligent platforms of the network are not described herein. Those of ordinary skill in the art will recognize, however, that these and other elements may be desirable in a typical telecommunications network. However, because such elements are well known in the art, and because they do not facilitate a better understanding of the present invention, a discussion of such elements is not provided herein.

The term "calling party" is used herein generally to refer to the person or unit that initiates a telecommunication. The calling party may also be referred to herein as "caller." In some cases, the calling party may not be a person, but may be a device such as a facsimile machine, an answering service, a modem, etc. The term "called party" is used herein generally to refer to the person or unit that answers or responds to the call or communication. The term "communication" is used herein to include all messages or calls that may be exchanged between a calling party and a called party, including voice, data and video messages. The term "communication" is used synonymously herein with the term "call" unless a distinction is noted. The term "subscriber" is used herein to generally refer to a subscriber of the described telecommunications service.

The present invention is directed, according to one embodiment, to a system and method for providing a simultaneous ring service for a service subscriber. According to the service, when a calling party places an incoming call to, for example, a residential telephone or some other landline telecommunications unit associated with the subscriber, not only does the subscriber's landline unit ring, but also a wireless telecommunications unit associated with the subscriber rings. Accordingly, if the subscriber is away from their landline unit, the subscriber does not have to miss the call. As described further herein, according to certain embodiments the subscriber's landline and wireless units do not ring at precisely the same time. It should be noted that the units may not ring exactly simultaneously, but rather within a relatively brief time period. However, because this time period may be relatively brief, such as on the order of 0-3 seconds, the service is referred to herein as a "simultaneous ring" service.

According to one embodiment, the system utilizes the intelligent functionality of an Advanced Intelligent Network (AIN). The AIN is a network used in conjunction with a

conventional telephone network, such as the public switched telephone network (PSTN), to provide enhanced voice and data services and dynamic routing capabilities using two different networks. The actual voice call is transmitted over a circuit-switched network, but the signaling is done on a separate packet-switched network. Before describing details of the system of the present invention, a description of the AIN is provided.

Figure 1 is a block diagram of an Advanced Intelligent Network (AIN) 10 for integration with the public switched telephone network (PSTN). The AIN 10 may be employed by a Local Exchange Carrier (LEC), and may be utilized by the LEC to allow the LEC to provide call processing features and services that are not embedded within conventional switching circuits of the PSTN.

A typical LEC includes a number of central office (CO) switches for interconnecting customer premises terminating equipment with the PSTN. For an LEC including the AIN 10 as illustrated in Figure 1, the central office switches may be provided as Service Switching Points (SSP) switches 12. The dashed line 14 between the SSP switches 12 indicates that the number of SSP switches 12 in the AIN 10 may vary depending on the particular requirements of the AIN 10. The AIN 10 may also include a non-SSP switch 16. The difference between the SSP switches 12 and the non-SSP switch 16 is that the SSP switches 12 provide intelligent network functionality. Interconnecting the SSP switches 12 and the non-SSP switch 16 are communication links 18 which may be, for example, trunk circuits.

Each SSP switch 12 and non-SSP switch 16 has a number of subscriber lines 20 connected thereto. The subscriber lines 20 may be, for example, conventional twisted pair loop circuits connected between the switches 12, 16 and the telephone drops for the customer premises, or the subscriber lines 20 may be trunk circuits, such as T-1 trunk circuits. Typically,

the number of subscriber lines 20 connected to each switch 12, 16 is on the order of ten thousand to one hundred thousand lines. Each of the subscriber lines 20 is connected to a terminating piece of customer premises equipment, represented in Figure 1 by the landline telephones 22. Alternatively, the terminating equipment may be other types of telecommunications units such as, for example, a telecopier, a personal computer, a modem, or a private branch exchange (PBX) switching system.

For the AIN 10 illustrated in Figure 1, each SSP switch 12 and the non-SSP switch 16 are connected to a signal transfer point (STP) 24 via a communication link 26. The communication link 26 may employ, for example, the SS7 switching protocol. The STP 24 may be a multi-port high speed packet switch that is programmed to respond to the routing information in the appropriate layer of the switching protocol, and route the data packets to their intended destination.

One of the intended destinations of the data packets from the STP 24 is a service control point (SCP) 28. The STP 24 is in communication with the SCP 28 via a communication link 30, which may also employ the SS7 switching protocol. The SCP 28 may be an intelligent database server such as, for example, an Intelligent Network Service Control Point available from Lucent Technologies Inc., Murray Hill, NJ, and may have associated with it a network database 32 for storing network data. The intelligent functionality of the SCP 28 may be realized by application programs, such as programmable Service Program Applications (SPA), which are run by the SCP 28. The SCP 28 is normally employed to implement high volume routing services, such as call forwarding and number portability translation and routing. In addition, another of the functions of the SCP 28 is hosting of the network database 32, which may store subscriber

information, such as subscriber call management profiles, used in providing enhanced calling services, such as the simultaneous ring service of the present invention.

The AIN 10 illustrated in Figure 1 also includes a services node (SN) 34. The SN 34 may be, for example, a Compact Services Node (CSN) available from Lucent Technologies Inc., Murray Hill, NJ, although the SN 34 may be any other type of available AIN-compliant SN. The SN 34 may be connected to one or more of the SSP switches 12 via a communications link 36 which may be, for example, an Integrated Service Digital Network (ISDN), including BRI (Basic Rate Interface) or PRI (Primary Rate Interface) lines. According to other embodiments, the communications link 36 may be, for example, a T-1 trunk circuit.

The SN 34 may be used primarily when some enhanced feature or service is needed that requires an audio connection to the call such as, for example, the call return and calling name services. Similar to the SCP 28, the intelligent functionality of the SN 34 may be realized by programmable applications executable by the SN 34. In addition, according to one embodiment, the SN 34 does not store any subscriber data necessary for implementing the simultaneous ring service of the present invention such as, for example, the directory number of the subscriber's wireless telephone unit.

In order to keep the processing of data and calls as simple as possible at the switches, such as at the SSP switches 12, a set of triggers may be defined at the SSP switches 12 for each call. A trigger in an AIN is an event associated with a particular subscriber line 20 that generates a data packet to be sent from the SSP switch 12 servicing the particular subscriber line 20 to the SCP 28 via the STP 24. The triggers may be originating triggers for calls originating from the subscriber premises or terminating triggers for calls terminating at the subscriber premises. A trigger causes a message in the form of a query to be sent from the SSP switch 12 to the SCP 28.

The SCP 28 in turn interrogates the database 32 to determine whether some customized call feature or enhanced service should be implemented for the particular call, or whether conventional dial-up telephone service should be provided. The results of the database inquiry are sent back from the SCP 28 to the SSP switch 12 via the STP 24. The return packet includes instructions to the SSP switch 12 as to how to process the call. The instructions may be to take some special action as a result of a customized calling service or enhanced feature. For example, for an enhanced calling feature requiring the capabilities of the SN 34, the return message from the SCP 28 may include instructions for the SSP switch 12 to route the call to the SN 34. In addition, the return message from the SCP 28 may simply be an indication that there is no entry in the database 32 that indicates anything other than conventional telephone service should be provided for the call. The query and return messages may be formatted, for example, according to conventional SS7 TCAP (Transaction Capabilities Application Part) formats. U.S. Patent 5,438,568, which is incorporated herein by reference, discloses additional details regarding the functioning of an AIN.

The AIN 10 illustrated in Figure 1 includes only one STP 24, one SCP 28, one network database 32, and one SN 34, although the AIN 10 may further include an additional number of these components as well as other network components which not are included in Figure 1 for purposes of clarity. For example, the AIN 10 may additionally include redundant SCPs and STPs to take over if the STP 24 or the SCP 28 should fail. In addition, the AIN 10 may include an Automatic Electronic Switching System (AESS) Network Access Point (NAP) in communication with the STP 24, which may be programmed to detect the trigger conditions. Further, the AIN 10 may include regional STPs and regional SCPs in communication with, for example, the local STP 24, for routing and servicing calls between different LECs.

As discussed hereinbefore, the present invention is directed, according to one embodiment, to a system for providing a simultaneous ring service for a service subscriber. Figure 2 is a diagram of a system 40 according to one such embodiment. The system 40 includes a landline network 42 and a wireless network 44. The landline network 42 includes portions of an AIN as described in conjunction with Figure 1, including the CO SSP switches 12a-c (designated as "CO" in Figure 2 and referred to as "CO switch(es)" hereinafter), the STP 24, the SCP 28, and the SN 34. For purposes of clarity, other elements of an AIN are not shown in Figure 2.

The wireless network 44 includes a mobile switching center (MSC) 46, a base transceiver station (BTS) 48, and a home location register 50. The MSC 46 is in communication with a wireless telecommunications unit 52, such as a wireless telephone as illustrated in Figure 2, via the BTS 48. The BTS 48 may communicate with wireless telecommunications unit 52 according to an air-interface communication scheme such as, for example, AMPS (ANSI-553), TDMA (IS-136), CDMA (IS-95), or GSM. The BTS 48 may be in communication with the MSC 46 via the communications link 54. The MSC 46 is an automatic switching system in a wireless telecommunications network that acts as the interface for subscriber traffic between the wireless network 44 and the landline network 42 or other MSCs in the same or other wireless networks. The MSC 46 performs the same general function as a central office switch in a landline based system. In addition, the MSC 46 supports incoming calls through a radio telecommunications front-end, as well as handoff and roaming functions. Accordingly, the MSC 46 may include wireless IN functionality for detecting originating and terminating triggers.

The MSC 46 may be in communication with the HLR 50 via a communications link 56 which may, for example, be an SS7 signaling protocol link. The HLR 50 is a location register to

which the user identity of a wireless telecommunications unit, such as the wireless telephone 52, is assigned for record purposes. The HLR 50 may register subscriber information relating to the wireless telecommunications units such as, for example, profile information, current location, and authorization period. When the MSC 46 detects a wireless telecommunications unit entering the MSC's service area, the MSC 46 performs a registration process that includes requesting subscriber profile information from either the HLR 50 or a visitor location register (VLR)(not shown), depending upon whether the wireless telephone 52 is within its home location or within a visitor location. Typically for integrated wireless networks, the VLR assigned to the service area of a visiting wireless subscriber is updated with information from the HLR associated with the wireless subscriber's wireless service provider (WSP). Accordingly, the MSC 46 servicing a particular area has access to information regarding each of the wireless users presently in its service area.

The landline network 42 additionally includes a tandem office 60, which provides a switching interface between the landline network 42 and the wireless network 44. The tandem office 60 may be in communication with the MSC 46 via a communications link 62, which may be, for example, a trunk circuit or an ISDN. In addition, the tandem office 54 may be in communication with the CO switches (such as the CO switches 12a,c as illustrated in Figure 2) via communications links 64, 66 respectively, which may be, for example, trunk circuits.

In addition, the SCP 28 may be in communication with the HLR 50 of the wireless network 44 via a communications link 68 employing, for example, the IS-41 signaling protocol.

For clarity in Figure 2, communications links that are used exclusively for signaling (e.g., no call data) are illustrated with dashed lines, and communications links that transfer signaling and/or call data are illustrated with solid lines.

Figures 3 and 4 provide a process flow for implementing the simultaneous ring service according to one embodiment of the present invention. The process is described herein with reference to the system 40 illustrated in Figure 2, with the calling party being a user of the landline telecommunications unit 22b and the landline telecommunications unit of the subscriber being the landline telephone 22a. In addition, the subscriber's associated wireless telecommunications unit is the wireless telephone 52. Of course, the calling party need not initiate the call from a landline phone, but instead may initiate the call from a wireless telephone that is routed to the CO switch associated with the subscriber's landline telecommunications unit.

Referring to Figure 3, the process initiates at block 80 with the calling party placing a call to the called party, the called party being a subscriber of the simultaneous ring service. From block 80 the process advances to block 82, where the CO switch 12a associated with the subscriber's landline telephone 22a, having been provisioned with a terminating attempt trigger (TAT) specific to the simultaneous ring service for the subscriber, launches a termination_attempt query message to the SCP 28 in response to triggering of the TAT by the incoming call.

Upon receiving the query message, the SCP 28 initiates a series of verifications. The verifications may be performed by one or more SPAs of the SCP 28, as described hereinbefore. The first verification, at block 84, requires the SCP 28 to determine if the SN 34 is active. The SCP 28 may perform this function by, for example, periodically making CDP (customized dialing plan) calls to the SN 34 to provide a heartbeat, thus allowing the SCP 28 to determine if the SN 34 is operational. If the SN 34 is not active (i.e., non-operational), the process advances to block 86, where the SCP 28 may send an authorize_termination message to the CO switch 12a

to route the call to the landline telephone 22a, without additionally forwarding the call to the subscriber's wireless telephone unit.

Conversely, if at block 84 the SCP 28 determines that the SN 34 is operational, the process may advance to block 88, where the SCP 28 may determine if the service subscriber currently has the service activated. The SCP 28 may perform this function by interrogating the SCP database 32. If the service is not currently activated, the process advances to block 84, where the SCP 28 may send an authorize_termination message to the CO switch 12a to route the call to the landline telephone 22a, without additionally forwarding the call to the subscriber's wireless telephone unit.

On the other hand, if the SCP 28 determines at block 88 that the service is activated, the process advances to block 90, where the SCP 28 determines whether the calling party number matches the subscriber wireless number (i.e., the directory number for the wireless unit 52), which is stored in the SCP database 32. If the numbers match, then the process advances to block 84 where the SCP 28 may send an authorize_termination message to the CO switch 12a to route the call to the landline telephone 22a, without additionally forwarding the call to the subscriber's wireless telephone unit, because this contingency typically corresponds to the subscriber calling home from the subscriber's wireless telephone, thus obviating the need to additionally ring the subscriber's wireless telephone.

Conversely, if the numbers do not match, the process advances to block 92, where the SCP 28 determines if the subscriber's landline unit, i.e., the telephone 22a, is busy or otherwise inactive. The SCP 28 may perform this function by sending a monitor_for_change message to the CO switch 12a requesting the status of the landline telephone 22a (e.g., busy, active). In

response to the query, the CO switch 12a sends back to the SCP 28 a status_reported message proving the existing status of the landline telephone 22a.

If the landline telephone 22a is busy or out of service, the process advances to block 86 where the SCP 28 may send an authorize_termination message to the CO switch 12a to route the call to the landline telephone 22a, without additionally forwarding the call to the subscriber's wireless telephone unit. As a result, the calling party will experience a busy signal.

On the other hand, if the landline unit 22a is not busy or out of service, it may be considered to be "available," and the process advances to block 94 where the SCP 28 determines if the wireless telecommunications unit (e.g., the wireless telephone 52) associated with the subscriber is busy or otherwise inactive. The SCP 28 may perform this function by sending, for example, an IS-41location_request message to the HLR 50 of the subscriber's wireless service provider (WSP) via the communications link 68 to request the status of the subscriber's wireless telecommunications unit 52. The address for the HLR 50 of the subscriber's WSP may be stored, for example, in the SCP database 32. In response to the query message, the HLR 50 sends a location_request_return_result message to the SCP 28 providing the status of the wireless telecommunications unit 52. If, for example, the wireless unit 52 is out-of-range or powered off, its status may be considered inactive. In addition, if the wireless unit 52 is in use and is not provisioned with call waiting, then the wireless unit 52 may be considered to be busy. If the wireless unit 52 is not busy or otherwise inactive, it may be considered to be "available."

If the wireless unit 52 is busy or otherwise inactive, the process advances to block 86 where the SCP 28 may send an authorize_termination message to the CO switch 12a to route the call to the landline telephone 22a, without additionally forwarding the call to the subscriber's wireless telephone unit. This step prevents busy and inactive forwards from answering the

incoming call before the subscriber can answer the landline phone 22a. Conversely, if the wireless unit 52 is not busy or otherwise inactive (i.e., available), the process advances to block 96 where the SCP 28 sends a forward_call message to the CO switch 12a to route the incoming call from the calling party to the SN 34.

According to another embodiment, at block 94 the SCP 28 may allow only a predetermined time period for the HLR 50 to respond in response to the IS-41location_request message such as, for example, two seconds. If the HLR 50 does not send the location_request_return_result message within the predetermined time period, the SCP 28 may assume, for example, that the wireless unit 52 is active, for which case the process flow advances to block 96.

Referring now to Figure 4, the process advances from block 96 to block 100, where the SN 34 places a first outgoing call. The intended destination of the first call from the SN 34 is the subscriber's wireless unit 52. However, because the SN 34 does have data regarding the subscriber's wireless directory number, the SN 34 sends the first call to the CO switch 12a with a wireless indicator. For example, according to an embodiment where the communications link 36 is a PRI trunk, the SN 34 may establish the call via a channel_setup_PRI trigger assigned to the SN PRI trunk 36, and a "wireless call" indication digit may be included in the redirecting_number field.

From block 100 the process advances to block 102, where the CO switch 12a servicing the subscriber's landline telephone 22a detects a terminating attempt trigger and, in response to the wireless call indication digit, sends a TAT query message to the SCP 28. In response to the query message from the CO switch 12a, at block 104, the SCP 28 interrogates the database 32

for the subscriber's wireless number, and forwards instructions to the CO switch 12a to route the first call from the SN 34 thereto.

From block 104 the process advances to block 106, where the SN 32 places a second outgoing call to the subscriber's landline telephone 22a. The intended destination of the second call is the landline telephone 22a; therefore the call does not include a wireless indicator. In response to receiving the second call, the CO switch 12a routes the second call to the landline telephone 22a according to conventional call processing. It should be noted that this call will also encounter a TAT, but the calling number, i.e., the SN 32, can be used to identify this as a call that should be completed to the telephone 22A.

According to one embodiment, because of inherent delays in existing wireless networks, the second call may be placed a predetermined time period after the first call from the SN 34 is placed such as, for example, four seconds. This predetermined time period may be implemented, for example, using a timer included with the SN 34.

From block 108 the process advances to block 110, where SN 34 determines which call is answered first. If at block 110 it is determined that the landline telephone 22a answers first (i.e., the second call from the SN 34), the process advances to block 112 where the SN 34 connects the calling party to the landline phone 22a. For example, if the trunk of communications link 36 handling the second call from the SN 34 delivers a call complete indication first, the incoming call is connected to that trunk. Next the process proceeds to block 114 where the SN 34 subsequently drops the first call (i.e., the call to the wireless unit 52). Thereafter, at block 116, the SN 34 transfers the second call to the CO switch 12a such that the SN 34 is no longer used to process the completed call. As a result, a user of the wireless unit 52 is free to originate unrelated outgoing calls if desired.

Returning to block 110, if the landline phone 22a is not answered first, the process advances to block 118 to determine if the wireless telephone 52 is answered first. If so, the process advances to block 120 where the SN 34 connects the calling party to the wireless telephone 52 (the first call from the SN 34). For example, if the trunk of communications link 36 handling the first call from the SN 34 delivers a call complete indication first, the incoming call is connected to that trunk. The process then advances to block 122 where the SN 34 subsequently drops the second outgoing call. Thereafter, the process advances to block 124 where the SN 34 transfers the first call to the CO switch 12a such that the SN 34 is no longer used to process the completed call. As a result, a user of the landline unit 22a is free to originate unrelated outgoing calls if desired.

If neither call from the SN 34 is answered, the process advances from block 118 to block 126 where the SN 34 may drop both calls and end any call processing.

According to one embodiment of the present invention, existing terminating call treatments, such as voice mail, may continue to apply. That is, as described hereinbefore, the calling party is connected to whichever telecommunications unit (the wireless unit 52 or the landline unit 22a) answers first, regardless of whether the answering party is a person or voice mail. To avoid undesirable side effects, however, the interaction of the voice mail systems with the simultaneous ring service of the present invention may require some modification of the voice mail systems such as, for example, increasing the number of rings before forwarding the incoming call to voice mail.

Although the present invention has been described herein with respect to certain embodiments, those of ordinary skill in the art will recognize that many modifications and variations of the present invention may be implemented. For example, certain of the

verifications performed by the SCP 28 described in conjunction with Figure 3 may be performed according to alternative sequences. The foregoing description and the following claims are intended to cover all such modifications and variations.